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U. S. DEPARTMENT OF AGRICULTURE.

REPORT

OF

THE BOTANIST

FOR

1894.

BY

FREDERICK V. COVILLE.

FROM THE REPORT OF THE SECRETARY OF AGRICULTURE FOR 1894.

WASHINGTON:

GOVERNMENT PRINTING OFFICE.

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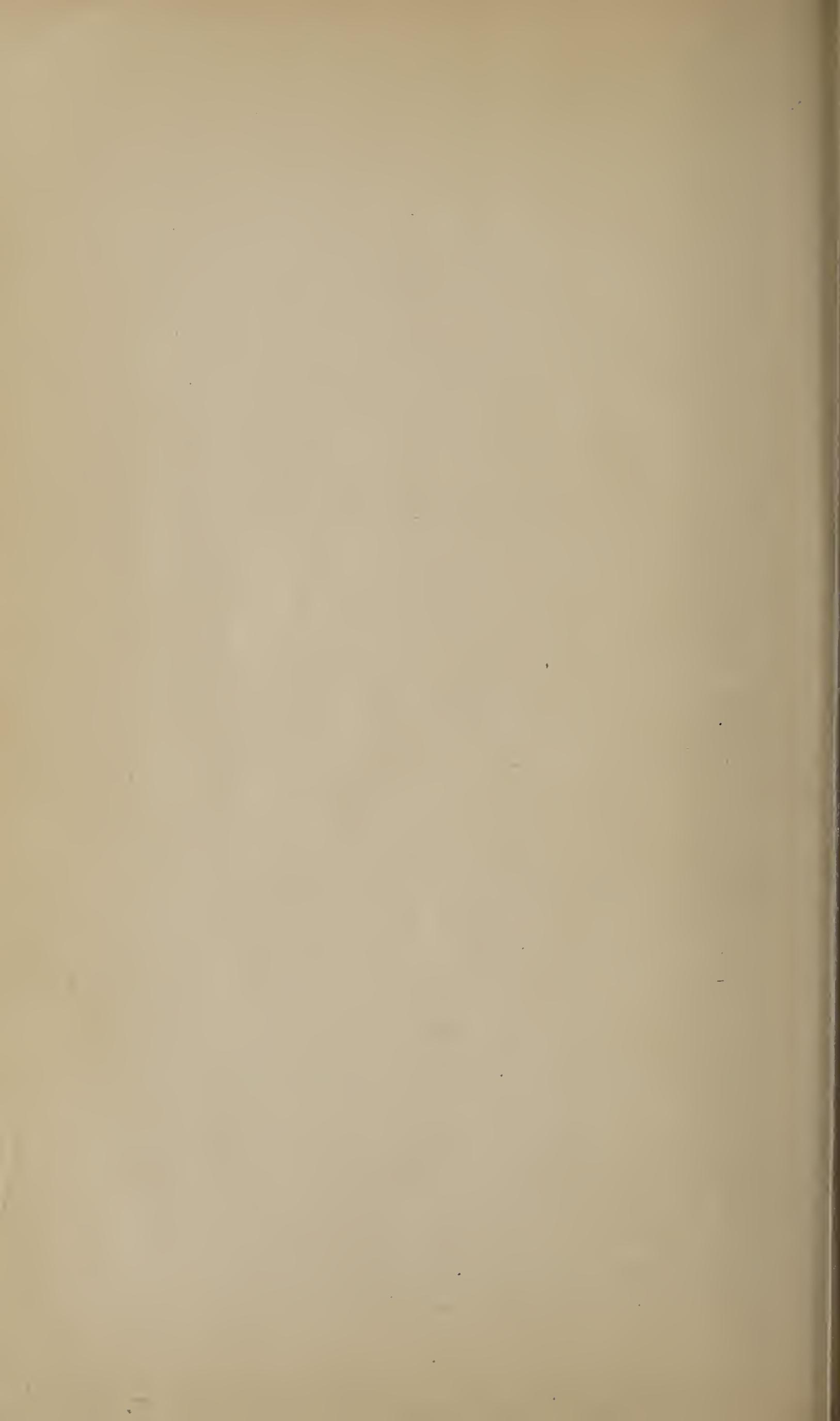
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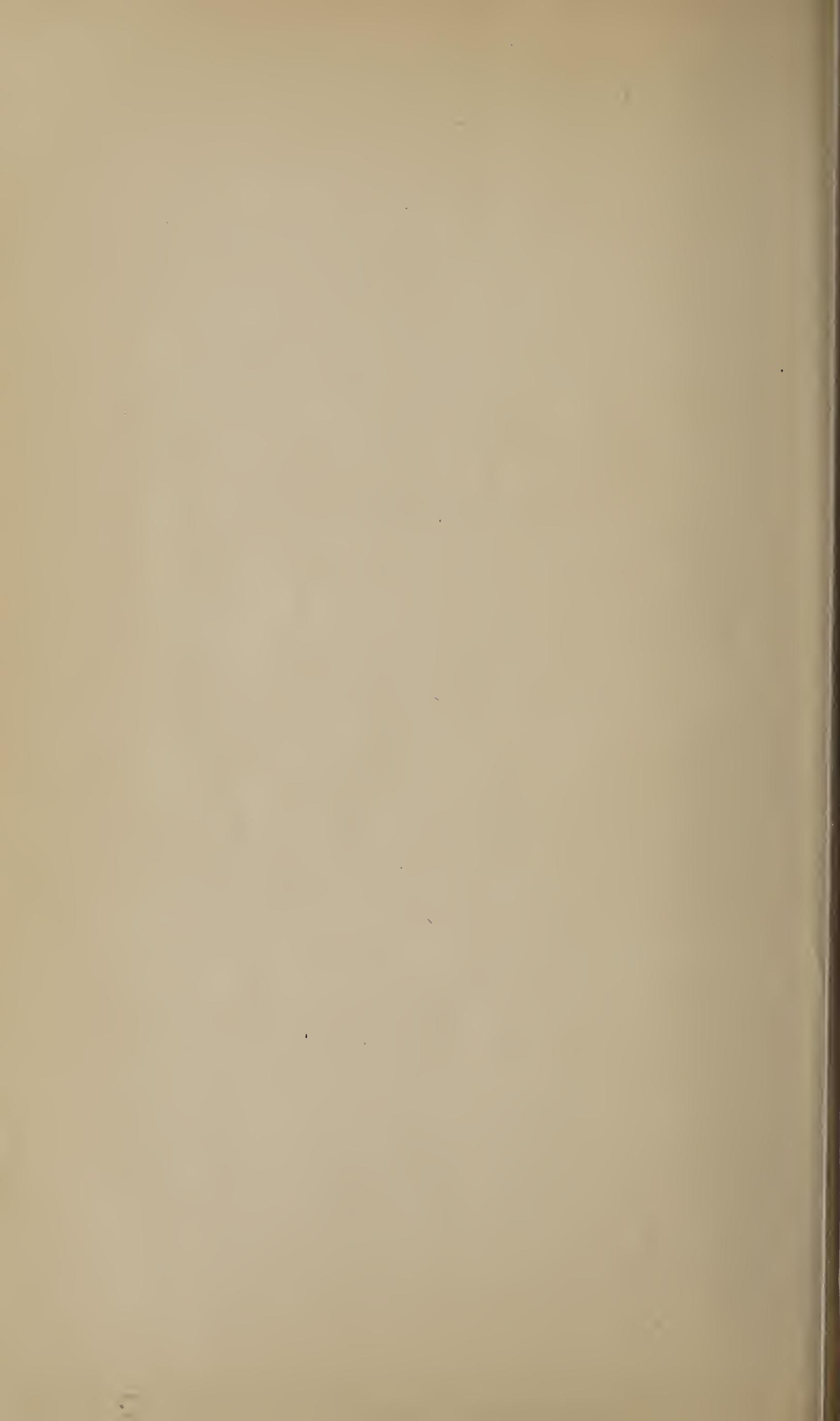
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REPORT OF THE BOTANIST.

SIR: I have the honor to submit herewith my second annual report, for the fiscal year ending June 30, 1894, reviewing briefly the year's work of the Division of Botany.

Very respectfully,

FREDERICK V. COVILLE,
Botanist.

Hon. CHAS. W. DABNEY, Jr.,
Assistant Secretary.

WORK OF THE YEAR.

The fiscal year ending June 30, 1894, has been devoted largely to a reorganization of the Division of Botany upon the basis of strengthening and broadening its work. The method followed to attain this result has been not to enlarge the scope of the division's work to cover the whole range of botany, but to direct the energies of each investigator to some specific problem, and to relieve him, so far as possible, from routine duties. The result promises to be highly satisfactory with regard to the whole amount of work produced. The most important steps taken during the year have been the discontinuance of the forage experiment station at Garden City, Kans., the appointment of a special agent for the investigation of grasses and other forage plants, and the appointment of an assistant to investigate the purity and germinative capacity of commercial seeds. The work on each of these subjects is outlined in the topical review that follows.

THE HERBARIUM.

In order to make the most useful disposal of the miscellaneous collections in the possession of the division, but not actually incorporated in the herbarium, a full set of the valuable portion of this material, 28,662 sheets in all, has been mounted and inserted in the herbarium, while the duplicate specimens have been distributed among 15 agricultural colleges and experiment stations and 18 educational institutions of other kinds, 7 of them in foreign countries. By means of the extra force employed for this purpose these accumulated miscellaneous collections are almost all out of the way, leaving for future disposition only the collections currently received.

Attention is called again to the unsatisfactory condition of the herbarium's quarters in the present building of the Department. Its continued growth has necessitated an increase in the number and height of the present cases, and the rooms, already overcrowded, are reaching the limit of their capacity. Indeed, a portion of the herbarium, including

the coniferous trees and several groups of lower plants, has already been transferred to one of the balconies of the library. The value of the herbarium has been variously estimated at from \$150,000 to \$250,000, and in view not only of its want of room but of its constant liability to destruction by fire, the only satisfactory place in which to put it is a commodious fireproof building.

FORAGE PLANTS.

March 24, 1894, Prof. F. Lamson-Scribner, the recognized American authority and expert on grasses, was appointed to conduct investigations on forage plants. The popular demand for information on this subject is evidenced by the great number of letters received by the Department asking especially for new and improved forage plants and for those adapted to peculiar soils and conditions. These objects have, therefore, been selected as the principal ones for immediate investigation, and at the same time reports looking toward popular education on the general subject of grasses are planned.

The commercial importance of a study of our forage plants is evidenced by the fact that the total product of the hay crop of the United States for the calendar year 1893, as estimated by the Division of Statistics, was 65,766,158 tons, valued at \$570,882,872. The total value of pasture in the United States, which has not been estimated, is perhaps equally great, and in this direction especially investigations are likely to prove of great value.

The present scope of Professor Scribner's work is indicated by the publications he now has in preparation. The first of these is a report which may be entitled *The Forage Plants of the United States*, suitable for the practical use and information of farmers regarding the grasses, clovers, and other plants valuable for pasture, hay, and silage in various parts of the United States. This work will be begun by issuing from time to time circulars of information for farmers, devoted to single forage plants. A second publication now under way is a report which may be designated *A Handbook of the Grasses of the United States*, which is to contain descriptions and illustrations of all the known grasses of the country. This work is intended for the use of botanists and agricultural students, and will aim to give such persons the means of identifying accurately and readily our native and introduced grasses.

SEEDS.

Early in the fiscal year plans were formulated to institute a series of laboratory investigations on the purity and germinative capacity of American seeds. After a careful search it was found impossible, on account of the comparative infancy of this line of investigation in the United States, to secure a man already an expert and authority on the subject. Through a civil-service examination held in December, 1893, was obtained a younger man, Mr. G. H. Hicks, well prepared by a literary, business, and botanical education to undertake the work.

The value of farms devoted exclusively to the raising of seeds in the United States was found by the census of 1890 to be \$18,325,935. Statistics of the value of the annual seed crop, both imported and domestic, are unfortunately not available, but it undoubtedly reaches many millions of dollars. The export of clover seed alone for the year ending June 30, 1894, had a total value of \$4,540,822. The importance, therefore, of increasing the domestic use and the export of American

seed by raising the standard of purity and germinating capacity and by diffusing information as to its high standard is at once apparent.

A laboratory well equipped with apparatus for separating, weighing, identifying, and germinating seeds has been built in the fourth floor of the main building. A collection of seeds to be used in identifying the seeds of weeds or other plants occurring in commercial samples is being rapidly accumulated by collecting, by gift, and by exchange. In addition, a nearly complete library of the literature of the subject, most of it produced in the last few years from the seed control stations of Germany, has been brought together and indexed.

A specific investigation of American clover seed has been planned and work on it already begun, the object being to collate and publish all the information which may aid in the production of a stronger and cleaner grade of clover seed, with reference not only to domestic use but to the export trade as well. The work of these seed investigations is preeminently educational, and close cooperation with the State experiment stations is therefore contemplated.

Early and continued attention will be given toward devising, by experiment and commercial application, a system of grading seeds. Such trade names as "prime," "extra prime," and "choice" are of only relative value, and in the catalogues of different firms have a varying significance. A system is demanded in which the points of excellence may be tabulated and the grade of a sample expressed numerically. For each kind of seed a standard grade should be adopted, and the excellence or deficiency of samples with respect to this standard should be the basis of their market value. The factors to be taken into account in ascertaining the grade of a sample are its purity and germinative capacity, expressed on a scale of 100. The selection of a standard grade for a particular variety must be based upon the examination of large series of commercial samples and the adoption of an approximate average. The results will be very different in the case of different seeds; for example, in red clover the common average of purity and germinative capacity is 90, while in Kentucky blue grass the common average is 50, indicating that under ordinary conditions of production higher grades of these seeds can not be expected. Such a system is already in partial use among German seedsmen and is much needed in the United States.

WEEDS.

In the reorganization of the division Mr. L. H. Dewey, assistant botanist, has been assigned to special work on weeds. No data are accessible for determining even approximately the amount of damage to agricultural production caused annually in the United States by weeds. The fact, however, that a single weed, the Russian thistle, from a careful estimate appears to have caused damage in the year 1893 to the amount of \$3,000,000 to \$5,000,000, principally within the limits of two States, gives a suggestion of the total loss. There are scores of other plants which are claimed to cause in the regions occupied by them quite as much damage as the Russian thistle, and although this can not be verified from actual data, it is undoubtedly true that several times the amount mentioned above is annually lost by the farmers of the United States through the damage caused by weeds.

The weed pest in the United States, as in all other countries, is a constant drain upon the agricultural resources of the nation, and, like drought or any other natural and irremediable agency, is generally treated in practice as beyond the control of the farmer. It is evident,

however, that in the vast majority of cases weeds are capable of almost complete subjection at an expenditure of labor easily within the power of the farmer and at a cost considerably less than the customary loss to his crops. The product of the principal crops for the calendar year 1893, including corn, wheat, oats, rye, barley, buckwheat, tobacco, potatoes, and hay had a total value of \$1,760,489,273. An increase of 1 per cent, which is easily obtainable in these crops through the subjection of weeds, would have amounted in this year alone to more than \$17,000,000.

The division has planned to disseminate circulars containing popular descriptions, with illustrations, which shall enable farmers to identify their weeds, and which shall contain directions and recommendations, derived from experiment and experience, on the best methods of their eradication. In the present elementary stage of this work, and on account of the want of such circulars, the correspondence on the subject of weeds is unusually heavy and is steadily increasing. In the near future it will be possible to answer many of these letters by circular.

THE RUSSIAN THISTLE.

In the fall of 1893 Mr. Dewey was again sent, as in 1892, to the thistle-infested region of the Northwest, and finished his investigations of this weed in a thoroughly satisfactory manner. The result of this work was published in a report entitled, *The Russian Thistle; its History as a Weed in the United States, with an Account of the Means Available for its Eradication*. This report, containing ample illustrations and maps, gives full information on methods of destroying the weed, dealing exhaustively with the practical side of the question. The data for the year 1893, collated in the report, show that the Russian thistle occurs as a destructive weed in North and South Dakota and in portions of Nebraska and Iowa, while it has been found in scattered localities in Wisconsin, Minnesota, and Colorado.

Whatever the ultimate progress of this weed, it may be stated that more literature aimed at its destruction has been issued from the Department of Agriculture and from State experiment stations within the past two years than has been devoted to any other single weed during the whole history of the country.

FIELD WORK.

During the year collectors have been employed in Alaska, Oregon, Washington, Idaho, Utah, Nebraska, and Kansas, and reports on the floras of some of the regions examined have been prepared. The lack of a sufficient force for elaborating these collections has prevented, however, a full realization of the available results.

CORRESPONDENCE.

A large amount of time has necessarily been devoted to the official correspondence of the division, the principal part of this correspondence consisting of answers to requests for information on some of the subjects that are now under investigation. Although addressed to the needs of individuals and not usually available for general publication, such letters are answered with care, and often after the expenditure of considerable labor in collating or verifying the contained information. During the year 2,982 letters have been written, copied, and sent out,

in addition to many thousand circulars, return acknowledgment cards, printed answers to requests for publications, etc. This work has been a serious tax on the divisional force, making an especial draft on the time of the Botanist himself.

Another class of correspondence which requires a large amount of time in addition to that taken up in the actual writing of the letters is the identification of plants received from all parts of the country, usually single specimens sent by private parties, but sometimes, especially those from experiment station botanists, packages containing hundreds of specimens. The work of identifying these plants has been intrusted principally to Dr. J. N. Rose, assistant botanist, and occupies the principal part of his time.

PUBLICATIONS.

The following publications have been issued during the year:

Report of the Botanist for 1892. By George Vasey, 1893. 8° , pp. 201-214, 9 plates. Contributions from the United States National Herbarium, Vol. I, No. 7. Systematic and Alphabetic Index to New Species of North American Phanerogams and Pteridophytes. Published in 1892. By Josephine A. Clark. Issued July 15, 1893. 8° , pp. iii, 233-264, index.

Contributions from the United States National Herbarium, Vol. I, No. 8. Notes on some Pacific Coast Grasses, by George Vasey; Descriptions of New or Noteworthy Grasses from the United States, by George Vasey; Descriptions of New Grasses from Mexico, by George Vasey; Descriptions of New Plants from Texas and Colorado, by J. M. Holzinger; List of Plants New to Florida, by J. M. Holzinger; Descriptions of Three New Plants, by J. N. Rose; List of Lichens from California and Mexico, collected by Dr. Edward Palmer from 1888 to 1892, by J. W. Eckfeldt. Issued October 31, 1893. 8° , pp. iii, 265-292, index, 5 plates.

Contributions from United States National Herbarium, Vol. IV. Botany of the Death Valley Expedition. A Report on the Botany of the Expedition sent out in 1891 by the United States Department of Agriculture to make a Biological Survey of the Region of Death Valley, California. By Frederick Vernon Coville. Issued November 29, 1893. 8° , pp. viii, 363, 21 plates and frontispiece.

Contributions from United States National Herbarium, Vol. II, No. 3. Manual of the Phanerogams and Pteridophytes of Western Texas. By John M. Coulter. Issued May 10, 1894. 8° , pp. v, 347-588.

Contributions from the United States National Herbarium, Vol. iii, No. 2. Preliminary Revision of the North American Species of Cactus, Anhalonium, and Lophophora. By John M. Coulter. Issued June 10, 1894. 8° , pp. iii, 91-132, index.

Bulletin No. 15. The Russian Thistle: Its History as a Weed in the United States, with an Account of the Means Available for its Eradication. By Lyster Hoxie Dewey. Issued (June) 1894. 8° , pp. 32, 3 plates, 2 colored maps.

Hungarian Brome Grass. By F. Lamson-Scribner. Issued (June) 1894. 8° , pp. 4.

PLANS FOR THE ENSUING YEAR.

It is proposed to continue during the year beginning July 1, 1895, the general lines of work already described, with certain enlargements, and the assumption of an additional subject of investigation, namely:

POISONOUS AND MEDICINAL PLANTS.

The division is almost constantly the recipient of inquiries on the medicinal value or poisonous qualities of native American plants, and in many cases these inquiries have more than the fanciful importance commonly attributed to them. During the year plants of undoubted medicinal value not recognized in our pharmacopœia have been received and are now awaiting a pharmacological examination. But a matter of more immediate public importance is the diffusion of information on plants known or reputed to be poisonous. One case of this

kind brought to the attention of the division was the death of five children early in the summer at Tarrytown, N. Y. These children had mistaken some root for sassafras, and after eating small quantities of it passed quickly through the successive stages of nausea, fever, convulsions, and death. The roots eaten by these boys have been found upon a careful examination to be nothing else than those of the common elder. If such an unknown danger as this lies almost at every man's door common humanity demands that the subject be investigated and the public be educated to the point of self-protection.

V. L. Bissell appointed in Nov 1894 Poisons
NEW FORAGE PLANTS.

There is little doubt that the parks and other natural grazing areas of the northern Rocky Mountain region contain succulent and nutritious grasses capable of successful introduction into cultivation. In this region wild species related to our cultivated fescue, red-top, and blue grass grow in the greatest profusion and luxuriance, and no systematic attempt has as yet been made to ascertain the possibility of their adoption into cultivation. It is recommended that liberal opportunity be given to examine these grasses in the field, and that space be set aside on the Department grounds for their tentative cultivation, while further arrangements be made for the testing of the more promising kinds in fields of larger size.

SEED INVESTIGATIONS.

It has been found necessary in connection with the experimental work of the seed laboratory to have greenhouse facilities for growing plants from some of the germinated seeds, and it is recommended that such facilities be provided.